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UNITED STATES PATENT AND TRADEMARK OFFICE

**PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES**

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte DONALD S. FARQUHAR, KONSTANTINOS I. PAPATHOMAS and
MARK D. POLIKS

Appeal No. 2004-0606
Application 09/781,730

ON BRIEF

Before PAK, OWENS and TIMM, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal is from the refusal to allow claims 23-25, 29, 31-33, 35-37, 39-43 and 45-49, which are all of the claims pending in the application. The rejection of claim 31 is withdrawn in the examiner's answer (page 2).

THE INVENTION

The appellants claim a method for making a device having a thermoset resin-impregnated, particle-containing fluoropolymer matrix laminated to a conductor. The appellants state that the device is useful in a high performance semiconductor device (specification, page 1, lines 3-8). Claim 23 is illustrative:

23. A method for forming a device, comprising the following steps:

providing a fluoropolymer matrix having particles therein;
coating a thermosetting resin on the fluoropolymer matrix;

processing the fluoropolymer matrix with the resin coated thereon such that material from the resin impregnates the fluoropolymer matrix, leaving a remaining layer of resin on a surface of the fluoropolymer matrix, wherein the remaining layer of resin comprises material of the resin that has not impregnated the fluoropolymer matrix; and

laminating the resin-impregnated fluoropolymer matrix to a conductor, wherein the conductor and the remaining layer of resin are disposed on opposite sides of the resin-impregnated fluoropolymer matrix following the laminating step.

THE REFERENCES

References relied upon by the examiner

Johnson	4,747,897	May 31, 1988
Ueno et al. (Ueno)	4,765,860	Aug. 23, 1988
Kusano et al. (Kusano)	5,425,832	Jun. 20, 1995
Kodokian	5,762,741	Jun. 9, 1998

Reference relied upon by the appellants

Abe et al. (Abe)	4,495,017	Jan. 22, 1985
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THE REJECTIONS

The claims stand rejected as follows: claims 23, 25, 29, 32, 35, 36, 40-43 and 45 under 35 U.S.C. § 102(b) as anticipated by Johnson; claims 24, 33 and 46-48 under 35 U.S.C. § 103 as obvious over Johnson in view of the appellants' admitted prior art; claim 37 under 35 U.S.C. § 103 as obvious over Johnson in view of Ueno and Kusano; and claims 39 and 49 under 35 U.S.C. § 103 as obvious over Johnson in view of Kodokian.¹

OPINION

We affirm the aforementioned rejections.

The appellants state that the claims stand or fall in the following groups: 1) claims 23-25, 29, 32, 33, 40-42 and 46-49; 2) claims 35, 36 and 45; 3) claim 37, 4) claim 39 and 5) claim 43. Although the appellants' admitted prior art, in addition to Johnson, is applied to claims 24, 33 and 46-48, these claims are not separately argued. We therefore limit our discussion to claims 37, 39, 43 and one claim in each of the

¹ Rejections of claim 48 under 35 U.S.C. § 112, second paragraph, and claim 31 under 35 U.S.C. § 103 as obvious over Johnson in view of Kodokian are withdrawn in the examiner's answer (page 2).

other groups, i.e., claims 23 and 35. See *In re Ochiai*, 71 F.3d 1565, 1566 n.2, 37 USPQ2d 1127, 1129 n.2 (Fed. Cir. 1995); 37 CFR § 1.192(c)(7)(1997).

Claim 23

Johnson discloses a method for forming a device which is useful in multilayer printed circuit boards (col. 1, lines 9-11), comprising providing a fluorocarbon fiber fabric which can contain a filler (col. 3, lines 5-6 and 12-16; col. 6, lines 54-55; col. 7, lines 12-13), coating an epoxy thermosetting resin onto the fabric such that the resin wets the fabric, penetrates into its interstices, and forms a level, even coating over the fabric surface (col. 6, lines 28-30; col. 7, lines 37-41), and laminating the resin-impregnated fabric to a copper foil conductor (col. 8, lines 7-16).

The appellants point out that Johnson teaches that "the resin in pre-preg sheets **30** is cured to a homogeneous, C-stage cured state to form the composite **34** and the metal foils **32** are firmly bonded to the composite **34**" (col. 6, lines 50-53) (brief, page 10). The appellants argue that it is physically impossible for a surface resin layer to exist on a fabric after the resin has been cured to a homogeneous state and that, therefore, this teaching indicates that there is no resin layer on the fabric

surface (brief, pages 9-10). The appellants apparently consider "homogeneous" to mean that the resin is homogeneously distributed within the sheets. The disclosure that the cured resin is homogeneous, however, means that the cured resin itself, regardless of where it is present, i.e., in or on the sheets, is homogeneous. Therefore, this disclosure does not indicate that there is no resin layer on the fabric surface.

The appellants argue that Johnson's disclosure of a C-stage fully cured laminate which is approximately 0.45 inches thick, has excellent resin wetting throughout it, and shows no evidence of air entrapment, blistering, resin voids or delamination between fabric layers (col. 7, line 64 - col. 8, line 1), indicates that there is essentially no resin thickness between the layers (brief, pages 10-11). The appellants apparently consider the disclosure of excellent resin wetting throughout the laminate to mean that there is no resin on the surface of the laminate. The disclosure which follows that disclosure indicates that the appellants' interpretation is incorrect: "Microscopic examination of cross sections of the laminated composite showed a uniform distribution of epoxy resin around the fibers, within the interstices of the fabric and between the layers of fabric" (col. 8, lines 1-4). The appellants argue that "uniform

distribution of epoxy resin around the fibers" means that the resin is only around the fibers and not between the layers (brief, page 11). Johnson's teaching that the resin also is "between the layers of fabric" indicates that this argument is incorrect.

The appellants argue that the above-cited portion of Johnson regarding microscopic examination of the fully cured resin applies only to example 1 and not to example 2 wherein the fabric is bonded to a conductor (brief, page 12). The appellants are incorrect as indicated by Johnson's disclosure that except for the bonding to the conductor, the conditions and materials in example 2 are the same as those in example 1 (col. 8, lines 7-10).

The appellants argue that Johnson's figure 8 shows surface bonding and does not show a resin layer (reply brief, page 2). Johnson discloses, regarding figure 8: "The resin in the center portion **36** has become homogeneous and fully cured to the C-stage state. The foils **32** are securely bonded to both sides of the composite **36**" (col. 7, lines 3-6). By "surface bonding" the appellants apparently mean that the conductor is bonded by the fluoropolymer to the fluoropolymer surface rather than being bonded to that surface by the epoxy resin. Johnson's teaching

that "[a]t temperatures at which the fluorocarbon pre-preg sheets will bond the package together, the innerlayers can melt or lose their dimensional stability" (col. 2, lines 13-15) indicates that the fluoropolymer is not used to bond the conductor to the fluorocarbon fabric surface but, instead, the bonding is provided by a layer of resin on the fabric surface.

For the above reasons we find that the method claimed in the appellants' claim 23 is anticipated by Johnson. Accordingly, we affirm the rejection of this claim and claims 24, 25, 29, 32, 33, 40-42 and 46-49 that stand or fall therewith.

Claim 35

Claim 35, which depends from claim 23, requires that the thermosetting resin includes solvent.

Johnson's disclosure that the resin in example 1 was converted into a dry, semi-cured state (col. 7, line 47) indicates that the resin was both dried, i.e., its solvent removed, and semi-cured. If the liquid resin were solventless, it reasonably appears that Johnson merely would have stated that the resin is semi-cured.

The appellants argue that Abe shows that it was known in the art to perform a B-stage cure using a resin dissolved in solvent and without a solvent (brief, page 13). Abe supports the

rejection rather than the appellants' argument because Abe teaches that up until that time, the only liquid resins used to impregnate fabrics were dissolved in a solvent (col. 1, lines 22-31). The solventless resins disclosed by Abe are powders or pastes, not liquid resins (col. 1, line 63 - col 2, line 6).

The appellants argue that curing can dry a solventless resin (reply brief, page 6). The appellants provide no evidence in support of this argument but, rather merely rely upon attorney argument. Such argument of counsel cannot take the place of evidence. See *In re De Blauwe*, 736 F.2d 699, 705, 222 USPQ 191, 196 (Fed. Cir. 1984); *In re Payne*, 606 F.2d 303, 315, 203 USPQ 245, 256 (CCPA 1979); *In re Greenfield*, 571 F.2d 1185, 1189, 197 USPQ 227, 230 (CCPA 1978); *In re Pearson*, 494 F.2d 1399, 1405, 181 USPQ 641, 646 (CCPA 1974).

The appellants argue that if Johnson's liquid resin contained a solvent, he would have said so (reply brief, page 7). In effect, Johnson's disclosure that the resin is a liquid and is dried is a statement that the resin, before drying, contained a solvent.

For the above reasons we affirm the rejection of claim 35 and claims 36 and 45 that stand or fall therewith.²

Claim 37

Claim 37, which depends from claim 23, requires that the fluoropolymer matrix is subjected to a plasma process prior to the coating step.

Ueno teaches that plasma treating a printed circuit board flexible plastic base which can be a polytetrafluoroethylene base, before it is bonded by an adhesive which can be an epoxy resin, to a metal foil which can be a copper foil, improves the bond between the plastic base and the metal foil (col. 3, lines 14-37; col. 5, lines 4-31).

Kusano teaches that treating a fluoropolymer, which can be polytetrafluoroethylene and can be in sheet form, with a plasma before it is bonded to a metal layer, which can be copper, using an adhesive, which can be an epoxy, improves the adhesion of the

² The appellants acknowledge that it was known in the art to perform a B-stage cure using a solvent-containing resin (brief, page 13). In the event of further prosecution the examiner and the appellants should address whether, regardless of whether Johnson discloses that his liquid epoxy resin contains solvent, Johnson's disclosure of liquid epoxy resin would have rendered the use of solvent-containing liquid epoxy resin *prima facie* obvious to one of ordinary skill in the art.

fluoropolymer to the metal (col. 3, lines 45-55; col. 4, lines 3-5; col. 6, lines 12-25; col. 6, line 66 - col. 7, line 2).

These teachings by Ueno and Kusano would have fairly suggested, to one of ordinary skill in the art, treating Johnson's fluoropolymer with a plasma to improve its adhesion by the epoxy resin to the copper foil.

The appellants argue that Johnson teaches that his bonding process is less expensive than a plasma process (brief, page 16). The appellants are incorrect because Johnson does not mention a plasma process.

The appellants argue that one would not use a plasma treatment in Johnson's process because it would add unnecessary time and expense (reply brief, page 9). Although the plasma treatment of Ueno and Kusano would not be necessary in Johnson's process, it would improve the adhesion of the fluoropolymer to the copper foil. Consequently, Ueno and Kusano would have fairly suggested, to one of ordinary skill in the art, use of their plasma treatment in Johnson's process to obtain this benefit.

Accordingly, we affirm the rejection of claim 37.

Claim 39

Claim 39, which depends from claim 23, requires that the thermosetting resin contains about 30-75% solids.

Johnson does not disclose the solids content of his epoxy resin. However, Johnson's teaching that the epoxy resin wets and penetrates into the interstices of the fabric (col. 6, lines 29-31) would have fairly suggested, to one of ordinary skill in the art, use of an epoxy resin having a sufficiently low solids content that the desired fabric penetration is achieved, with the optimum solids content, such as one within the broad range recited in the appellants' claim 39, being determined through no more than routine experimentation. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

The appellants argue that one of ordinary skill in the art would not have readily understood that Johnson's resin would have to have no more than 75% solids (brief, page 18; reply brief, page 10). As discussed above, a solids content that low would have been fairly suggested to one of ordinary skill in the art by Johnson to obtain the desired fabric penetration.

We therefore affirm the rejection of claim 39.³

³ A discussion of Kodokian is not necessary to our decision.

Claim 43

Claim 43, which depends from claim 23, requires that the fluoropolymer matrix is impregnated with the thermosetting resin prior to the providing step.

The appellants' claim 23 does not specify the order of the steps. Hence, the coating step which, as recited in the claim, impregnates the matrix, can take place before the providing step and thereby provide the impregnation required by claim 43. Such impregnation before lamination is disclosed by Johnson (example 1).

The appellants argue that Johnson does not disclose impregnating the matrix with the thermosetting resin prior to the providing step (reply brief, page 7). As discussed above, Johnson provides such a disclosure.

Accordingly, we affirm the rejection of claim 43.

DECISION

The rejections of claims 23, 25, 29, 32, 35, 36, 40-43 and 45 under 35 U.S.C. § 102(b) over Johnson, claims 24, 33 and 46-48 under 35 U.S.C. § 103 over Johnson in view of the appellants' admitted prior art, claim 37 under 35 U.S.C. § 103

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over Johnson in view of Ueno and Kusano, and claims 39 and 49 under 35 U.S.C. § 103 over Johnson in view of Kodokian, are affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

<i>Chung K. Pak</i>)
CHUNG K. PAK)
Administrative Patent Judge)
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